The Jacks Creek Total Maximum Daily Load (TMDL) Modification Of the Bruneau River Watershed Management Plan (Lake Walcott TMDL)

By

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INFORMATION AT A GLANCE	
303(d) Waterbody	Jacks Creek
Subbasin & HUC	Bruneau River Subbasin - 17050102
Pollutants of Concern	Sediment, nutrients, bacteria
NPDES Aquaculture Permitted Facilities	Ace Development USA, Inc.: NPDES No. 130123 Arraina Inc.: NPDES No. 130122
Approved TMDL - Year Approved	Bruneau River TMDL - 2000

I. INTENT AND PURPOSE

The intent and purpose of the Jacks Creek TMDL Modification is to establish water quality load allocations for sediment, nutrients and bacteria on Jacks Creek in the Bruneau River Subbasin. Jacks Creek is a §303(d) listed waterbody; and is generally described in the Bruneau River Total Maximum Daily Load (i.e. Bruneau River TMDL) as having its beneficial uses impaired (Lay 2000 [p 42, §2.1.4.2.2]). The receiving waterbody to Jacks Creek is the C. J. Strike Reservoir reach of the Snake River, which is also §303(d) listed. Consequently, the Jacks Creek TMDL Modification is necessary to protect the beneficial uses of the Snake River as part of the Bruneau River TMDL. In the Bruneau River TMDL the aquaculture fish hatcheries were originally assigned a wasteload allocation based on a concentration limit that was not possible to meet as warm water facilities. The Jacks Creek TMDL Modification corrects this inconsistency and at the same time implements the application of State water quality standards that are based on the relationship between pollution sources and instream water quality conditions for meeting beneficial uses. The Jacks Creek TMDL Modification establishes the allowable loadings and quantifiable parameters for Jacks Creek and provides the basis for the State to establish water quality-based controls. These controls should provide the pollution reduction necessary for Jacks Creek to meet water quality standards. The TMDL may require more stringent reductions through implementation of other best management practices or limitations if water quality standards and beneficial uses are not achieved.

II. IDENTIFICATION OF WATERBODY, POLLUTANTS OF CONCERN, POLLUTANT SOURCES, AND PRIORITY RANKING

Jacks Creek is specifically identified in the Bruneau River TMDL (Lay 2000 [p 3, Table 1]) as a §303(d) listed waterbody. The Bruneau River system is a tributary to the Snake River and is known as the “Bruneau Arm of the Snake River”. This system discharges into the Snake River at River Mile 494.9 of the Snake River. Within the Bruneau River system, Jacks Creek discharges at River Mile 12.5 (EPA 2006). As described in the Bruneau River TMDL, Jacks

Creek begins at the confluence of Big Jacks Creek and Little Jacks Creek (Lay 2000 [p 30, §2.1.2.2]).

The pollutants of concern are based on the water quality impairments to Jacks Creek itself as well as to the C. J. Strike Reservoir as described in the Bruneau River TMDL. The primary pollutants-of-concern are sediment (as total suspended solids or TSS), nutrients (as total phosphorus or TP), and bacteria (as *Escherichia coli* or *E. coli*) (Lay 2000 [pp 56-58, 63-65, 95-97]). Linked to these pollutants-of-concern is dissolved oxygen (or DO). Water cleanup efforts associated with sediment, nutrients and bacteria and as discussed in the Bruneau River TMDL (Lay 2000 [pp 91-92, 96]) are expected to improve DO levels and the overall water quality of Jacks Creek.

Jacks Creek is a high priority stream and is presently under implementation planning as a post-TMDL component in the Bruneau River TMDL process. As part Idaho's TMDL process, Jacks Creek underwent a subbasin assessment process to assess the beneficial use support status which is defined in the Bruneau River TMDL (Lay 2000 [pp 55, Table 11]). After determination that Jacks Creek was a water quality limited stream and required a TMDL, it was determined (with consultation from the stakeholders of the Bruneau River Subbasin) that the application of pollution controls to point sources and nonpoint sources would help to restore the beneficial uses of Jacks Creek. DEQ developed the TMDL taking the following into consideration:

(1) Identification of significant sources of pollution from past and present activities;

(2) Application of cost-effective interim pollution control strategies to the point sources and nonpoint sources to achieve full support status within a reasonable period of time;

(3) Consultation with the appropriate stakeholders in the Bruneau River Subbasin, designated agencies and private landowners to determine the feasibility of cost-effective interim pollution control strategies that can be effectively applied to the sources of pollution to achieve full support status within a reasonable period of time; and

(4) After the application of pollution control strategies in Jacks Creek, IDEQ-TFRO shall monitor Jacks Creek to determine whether application of such pollution controls were successful in restoring Jacks Creek to full support status.

Since Jacks Creek is a high priority §303(d) stream under implementation planning with an approved TMDL, any new or increased discharge of causative pollutants will be allowed only if consistent with the approved TMDL. The dominant pollution impacts on the water quality of Jacks Creek has been determined to come from agricultural sources. As such, agricultural operations are strongly encouraged to adopt best management practices on a voluntary basis as prescribed in Idaho Code.

III. DESCRIPTION OF THE APPLICABLE WATER QUALITY STANDARDS AND NUMERIC WATER QUALITY TARGET

The Bruneau River TMDL Modification describes the application water quality standards for Jacks Creek (Lay 2000 [p 55, §2.3.2]). Jacks Creek does not have designated beneficial uses under the rules and regulations for the state of Idaho. The existing beneficial use is warm water aquatic life under the Bruneau River TMDL (Lay 2000 [p 55, Table 11]) due to the influence of artesian geothermal sources that provide the overall water flow into Jacks Creek annually (Buhidar 2006). These warm water sources do not necessarily preclude cold water from running through Jacks Creek during high flow events from Little Jacks Creek or Big Jacks Creek. Consequently, Jacks Creek is more descriptive of a modified system, which is yet to be determined based on the chemical, physical, and biological levels necessary to attain the existing aquatic life community for a modified aquatic life level. Secondary contact recreation standards will be applied on Jacks Creek since primary recreational activities are not known to exist. As described in the Jacks Creek TMDL Technical Support Document the primary purpose for Jacks Creek is as an agricultural drain from the Jacks Creek drainage to the C. J. Strike Reservoir (Buhidar 2006 [§2.4 and §2.4.1]).

Jacks Creek is §303(d) listed in the 2002 Integrated Report and has a pollutant listing for bacteria, organic enrichment (as low DO), phosphorus and siltation (IDEQ 2005 [pp 208-209 *based on the PDF format for the page structure*]). Table 1 below shows the National Assessment Database (EPA 2002) for the Bruneau River Watershed. It shows the assessment units (AUs) catalog number and water quality status of Jacks Creek in the Bruneau River Subbasin.

Table 1. Jacks Creek Assessment Units and Water Quality Status

JACKS CREEK DESIGNATION	ASSESSMENT UNIT (AU) IDENTIFICATION	WATER QUALITY STATUS PER AU	STATE OF IDAHO IDENTIFICATION
Confluence of Little and Big Jacks Creeks to C. J. Strike Reservoir	ID-17050102SW002_02[A]	Not Assessed	SW-2[F]
	ID-17050102SW002_03[B]		
	ID-17050102SW002_04[C]		
	ID-17050102SW002_05[DE]	Impaired	

AU = Assessment Unit. ID = Idaho. I = Impaired. NA = Not Assessed.
[A]AU ID-17050102SW002_02 = 1st and 2nd Rosgen Order.
[B]AU ID-17050102SW002_30 = 3rd Rosgen Order.
[C]AU ID-17050102SW002_04 = 4th Rosgen Order.
[D]AU ID-17050102SW002_05 = 5th Rosgen Order.
[E]The 1998 303(d) Crosswalk developed by IDEQ-State Office for linking the 1998 303(d) water quality limited streams (like Jacks Creek) to its appropriate assessment unit has ID-17050102SW002_05 as water quality limited stream segment ID2551 (approximately 12.28 miles) for the designation from Little Jacks Creek to C. J. Strike Reservoir. This is the impaired segment of Jacks Creek (the 5th Rosgen Order) that is 303(d) listed in the overall assessment unit. The other segments of Jacks Creek (the 1st, 2nd, 3rd and 4th Rosgen Order) were not assessed.
[F]Based on IDAPA §58.01.02.140.02 - Bruneau Subbasin as part of the Southwest Idaho Basin.

The numeric water quality standards imposed by the Jacks Creek TMDL Modification are based on the assumptions promulgated by the Bruneau River TMDL (Lay 2000) and more fully developed in the Jacks Creek TMDL Technical Support Document (or Jacks Creek TMDL Technical Support Document; Buhidar 2006) for the establishment of wasteload allocations for the fish hatcheries on Jacks Creek. These instream standards are described as follows:

1. Sediment. According to IDAPA §58.01.02.200.08, sediment shall not exceed quantities which impair designated beneficial uses. The Bruneau River TMDL showed that the water quality of Jacks Creek is impaired due to the excess sediment concentrations; sediment being listed specifically as a pollutant and/or stressor (Lay 2000 [p 48, §2.2.1, Table 8]).

Water quality in Jacks Creek was reported to have total suspended sediment (TSS) at 40.0 mg/L (mean); but has also been shown to have maximum concentrations of 96.0 mg/L TSS (Lay 2000 [p 64, Table 14]). The Jacks Creek TMDL Technical Support Document showed a seasonal average of 41.5 mg/L TSS and a maximum value of 81.4 mg/L TSS (Buhidar 2006 [§5.2, Table 5, and §5.2.2]). The recommended instream water quality target for TSS is 50 mg/L (average monthly) in Jacks Creek as a tributary to the Bruneau River (Lay 2000 [p 57]). Therefore, during certain times of the irrigation season and/or the spring flush, the instream water quality standard of 50.0 mg/L monthly average was exceeded.

2. Nutrients. According to IDAPA §58.01.02.200.06, surface waters of the state (like Jacks Creek) shall be free from excess nutrients that can cause visible slime growths or other nuisance aquatic growths impairing designated beneficial uses. The Bruneau River TMDL showed that the water quality of Jacks Creek is impaired due to the excess nutrient concentrations (as TP); nutrients being listed specifically as a pollutant and/or stressor (Lay 2000 [p 48, §2.2.1, Table 8]).

   Water quality in Jacks Creek was reported to have total phosphorus (TP) at 0.187 mg/L (mean); but has also been shown to have a maximum concentration of 0.296 mg/L TP (Lay 2000 [p 64, Table 14]). The Jacks Creek TMDL Technical Support Document showed a seasonal average of 0.233 mg/L TP and a maximum value of 0.300 mg/L TP (Buhidar 2006 [§5.2, Table 5, and §5.2.3]). The recommended instream water quality target for TP, as assessed in the Bruneau River TMDL, was 0.050 mg/L TP monthly average (Lay 2000 [p 56]). However, upon further study of the Jacks Creek drainage and the agricultural industry that utilizes this stream along with artesian geothermal water that elevates its temperature; and since Jacks Creek is more historically characteristic of agricultural conveyances that carry tailwater and have utilized a 0.100 mg/L TP target; it was determined that a more appropriate instream target would be the 0.100mg/L TP target (Buhidar 2006 [§6.4.2 and §7.2]).

3. Bacteria. Jacks Creek, as described in the Bruneau River TMDL, has secondary contact recreation standards (Lay 2000 [p 64, §2.4.2; pp 92-93, §3.1.3]) that are appropriate for fishing, boating, wading, infrequent swimming, and other activities where ingestion of raw water is not likely to occur (IDAPA §58.01.02.100.02.b). Based on IDAPA §58.01.02.251.01.a, the *E. coli* bacteria standard is a geometric mean criterion (for both primary and secondary contact recreation) of 126 *E. coli* organisms/100 mL based on a minimum of five (5) samples taken every three (3) to five (5) days over a thirty (30) day period. The "trigger" for this target will be a single sample value of 576 *E. coli* organisms/100 mL based on the secondary contact recreational standard (IDAPA §58.01.02.251.01.b.i).

   E. coli in Jacks Creek was reported in the Bruneau River TMDL to average 806 cfu/100 mL (annual); but has also been shown to have maximum concentrations of 2,400 cfu/100 mL (Lay 2000 [p 64, Table 14]). This was described in the TMDL as being "above the threshold values indicating the recreation beneficial uses may not be supported" (Lay 2000 [p 64]). Further

sampling conducted during the development of the Bruneau River TMDL was done to collect enough samples to apply the geometric mean water quality standard (126 cfu/100 mL) and the results indicated that the secondary contact recreation is not supported as well. During the development of the Jacks Creek TMDL Technical Support Document it was determined that the average *E. coli* value was 2,395 cfu/100 mL with a maximum value of 10,725 cfu/100 mL. Due to resource constraints it was not possible to monitor additionally to ascertain the geometric mean; however, sufficient information exists to infer from the instantaneous values collected throughout Jacks Creek that in all likelihood the geometric mean would also be exceeded for the secondary contact recreation standard (Buhidar 2006 [§5.2, Table 5]). Because of the higher values of TSS and TP (as previously noted), and since *E. coli* is not scientifically known to be developed in the intestines of cold-blooded fish, it was assumed that the *E. coli* comes from the predominant agricultural sources in the Jacks Creek drainage.

IV. LOADING CAPACITY – LINKING WATER QUALITY AND POLLUTANT SOURCES

The loading capacity (LC) is the greatest amount of loading that a water can receive without violating water quality standards. In the case of Jacks Creek, the LC is dictated in great measure by flow that is present due to the agricultural industry activities within the Jacks Creek drainage; Jacks Creek being the receiving 303(d) listed waterbody. In order for Jacks Creek to meet water quality standards, it is imperative that the sources contributing pollutants to Jacks Creek meet water quality standards as well. Otherwise, attainment of water quality standards (and beneficial uses) cannot be achieved in Jacks Creek.

In order to determine the LC for Jacks Creek, it is necessary to have an estimate of the flow from the creek prior to discharge into the Bruneau Arm of the Snake River (or the C. J. Strike Reservoir). Based on the Jacks Creek TMDL Technical Support Document the average flow in Jacks Creek is 17.49 cfs (Buhidar 2006 [§6.4.2, Table 24]).

Based on the Bruneau River TMDL provisions for instream water quality standards (or targets) for TSS (Lay 2000); and the Jacks Creek TMDL Technical Support Document provisions for instream water quality standards (or targets) for TP and *E. coli*; the Jacks Creek LC is defined as follows (as previously described in Section III):

1. Sediment (as TSS): 50 mg/L (average monthly) in the tributaries. Therefore,

   TSS LC = 50 mg/L TSS x 17.49 cfs x 5.4 = 4,722.3 lb/day TSS LC

2. Nutrients (as TP): The recommended instream water quality target for TP is 0.100 mg/L TP as previously described in Section III. Therefore,

   TP LC = 0.100 mg/L TP x 17.49 cfs x 5.4 = 9.44 lb/day TP LC

3. Bacteria (as *E. coli*): The secondary recreational standard is a geometric mean of 126 *E. coli* organisms/100 mL based on five (5) samples taken over a 30-day period at equal intervals between samples. Therefore,

   126 cfu/100 mL *E. coli* x 17.49 cfs x 0.02445 = 53.9 cfu^9/day *E. coli* LC

The current or existing load for Jacks Creek has been determined based on the Jacks Creek TMDL Technical Support Document and is shown in Table 2 as a comparison to the LC (Buhidar 2006 [[§6.4.2, Table 24]). On an average basis, the two parameters that will require reductions will be TP and *E. coli*. TSS may only be required during certain parts of the irrigation season; but the application of best management practices may be needed to maintain a water quality strategy year 'round.

Table 2. The LC and average existing load for Jacks Creek on TSS, TP and *E. coli*

JACKS CREEK	TSS, lb/day	TP, lb/day	*E. coli*, cfu^{9}/day
Loading Capacity	4,722.3	9.44	53.9
Existing Load	3,919.5	22.01	1,024.2
% Reduction to Meet LC	Below LC	57.1%	94.7%

TSS = Total Suspended Solids. TP = Total Phosphorus. *E. coli* = *Escherichia coli* bacteria. LC = Loading Capacity.

V. WASTELOAD ALLOCATIONS (WLAs)

The wasteload allocation (WLA) is the portion of a receiving water's LC that is allocated to one of its existing or future point sources of pollution. Since Jacks Creek is on the 303(d) list of the federal Clean Water Act, the application of the instream standards is based on achieving the beneficial uses of Jacks Creek by having a LC for each pollutant.

Only two (2) point sources are known to exist on Jacks Creek. These are the Ace Development USA, Inc. (NPDES No. ID-130123) and the Arraina Inc. (NPDES No. ID-130122) fish hatcheries. The WLAs for these facilities is based on the discharge monitoring records for the period of record from March 2000 to March 2004 (or N = 23 and N = 22, respectively).

Table 3 summarizes the existing water quality conditions of each fish hatchery in terms of the influent, effluent and net discharge into Jacks Creek. Only the water quality parameters for TSS, TP and E. coli are being considered for the Jacks Creek TMDL Modification.

Table 3. Existing characteristics of the fish hatcheries on Jacks Creek

FACILITY CHARACTERISTIC	FLOW, cfs	TSS, mg/L	TP, mg/L	*E. coli*, cfu/100 mL
Arraina Inc. Fish Hatchery				
Influent	5.5	1.1	0.012	0
Effluent	4.4	17.7	0.235	0 + Unknown[A]
Net	-	16.6	0.223	0 + Unknown[A]
Ace Development USA, Inc. Fish Hatchery				
Influent	3.7	1.0	0.020	0
Effluent	2.7	26.6	0.351	0 + Unknown[A]
Net	-	25.6	0.331	0 + Unknown[A]
Combining Both Facilities				
Influent	9.2	1.05	0.016	0
Effluent	7.1	22.15	0.293	0 + Unknown[A]
Net	-	21.1	0.277	0 + Unknown[A]

The information contained in Table 3 comes from the Jacks Creek TMDL Technical Support Document (Buhidar 2006 [§5.6 and §5.2 - Table 5]). Net = Effluent - Influent. TSS = Total Suspended Solids. TP = Total Phosphorus. *E. coli* = *Escherichia coli*.
The *E. coli* values are based on the influent artesian well water which has zero *E. coli*. The effluent that is discharged from the facilities contains zero *E. coli*. However, that same effluent prior to discharge to Jacks Creek has exposure agricultural nonpoint source activities and consequently may contain *E. coli* which is unrelated to the fish hatchery per say.

Table 4 summarizes the wasteload allocations for the fish hatcheries on Jacks Creek based on the water quality characteristics shown in Table 3 for TSS (based on a 15.0 mg/L concentration

for warm water fishery), TP (based on a 0.200 mg/L concentration for warm water fishery) and *E. coli* (based on a zero concentration for all fishery).

Table 4. Wasteload allocations for fish hatcheries on Jacks Creek

FACILITY CHARACTERISTIC	FLOW, cfs	TSS, lb/day Based on 15.0 mg/L target	TP, lb/day Based on 0.200 mg/L target	*E. coli*, cfu[9]/day Based on 0.0 cfu/100 mL target
Arraina Inc. Fish Hatchery				
Influent	5.5[C]	26.1[A]	0.29[B]	0 + Unknown[F]
Effluent	4.4[C]	420.6[A]	5.58[B]	0.0[F]
Existing Net Load	-	394.4[A]	5.3[B]	0.0 + Unknown[F]
Net Load Target	-	356.4[D]	4.8[B]	0.0
% Reduction	-	9.6%[D]	9.4%[B]	0.0%
Ace Development USA, Inc. Fish Hatchery				
Influent	3.7[C]	14.6[A]	0.29[B]	0 + Unknown[F]
Effluent	2.7[C]	387.8[A]	5.12[B]	0.0
Existing Load	-	373.2[A]	4.8[B]	0.0 + Unknown[F]
Net Load Target	-	218.7[D]	2.9[B]	0.0
% Reduction	-	41.4%[D]	39.6%[B]	0.0%
Combining Both Facilities				
Influent	9.2[C]	40.7[E]	0.58	0 + Unknown[F]
Effluent	7.1[C]	808.4[E]	10.70	0.0[F]
Existing Load	-	767.2[D]	10.10[B]	0.0 + Unknown[F]
Net Load Target	-	575.1[D]	7.70[B]	0.0
% Reduction	-	25.0%[D]	23.8% (Mean)	0.0%

Net = Effluent - Influent. TSS = Total Suspended Solids. TP = Total Phosphorus. *E. coli* = *Escherichia coli*.
[A]TSS load analysis based on Jacks Creek TMDL Technical Support Document, §5.6, Tables 13 and 14.
[B]TP existing load from Jacks Creek TMDL Technical Support Document, §5.6, Table 11 and 12.
[C]Flow information from Jacks Creek TMDL Technical Support Document, §5.6, Table 8.
[D]Net TSS Load Target based on Jacks Creek TMDL Technical Support Document, §5.6, Tables 14 and 15 based on a Net TSS Target of 15 mg/L.
[E]Influent and Effluent combined loads are based on the additional of the loads from both facilities.
[F]Based on Table 3. The effluent is assumed to be zero (0.0) since no *E. coli* are generated from the fish production. Consequently, that *E. coli* that is generated is assumed to come from non fish sources.

1. TSS WLA: The TSS limitation for raceway effluent discharges for warm water fish hatcheries is 15.0 mg/L Net TSS. This limit has foundation and precedence in the 1999 Idaho General Aquaculture Permit (NPDES No. ID-G13-0000; EPA 1999 [Section C. 2. Warm Water Raceway and Associated Full-flow Settling Basin Discharges]). Therefore, the use of the 15.0 mg/L Net TSS for warm water facilities in the Jacks Creek TMDL Modification is consistent and provides a rational basis for use of this provision. It is not based on the TMDL process developed under the Mid-Snake TMDL (Buhidar 1997) or the Upper Snake Rock TMDL (Buhidar 1999, Buhidar 2000) or the modifications incorporated in the Upper Snake Rock TMDL Modification (Buhidar 2005) because these were handled where the aquaculture industry had to meet a certain target load (i.e. based on 5.0 mg/L TSS) as a consequence of the receiving 303(d) waterbody (i.e. the Snake River) (Buhidar 2005).

   Therefore, based on the discharge monitoring reports for the period of record for the Arraina facility (May 2000 through February 2004) and the Ace facility (May 2000 through February 2004), the following are the Net TSS WLAs (as shown in Table 4):

Arraina Facility: 15.0 mg/L TSS x 4.4 cfs (mean) x 5.4 = 356.4 lb/day TSS
Ace Facility: 15.0 mg/L TSS x 2.7 cfs (mean) x 5.4 = 218.7 lb/day TSS

Based on the discharge monitoring reports for the Arraina facility period of record (May 2000 through February 2004), the raceway average TSS net target load was exceeded 12 times in 24 sampling months (or 50.0% of the time). The Ace Development facility for the same period of record exceeded the TSS net target load 16 times out of 22 sampling months (or 72.7% of the time).

2. TP WLA: The TP limitation for raceway effluent discharges for warm water fish hatcheries is 0.200 mg/L Net TP. This limit has foundation and precedence in the 1999 Idaho General Aquaculture Permit (NPDES No. ID-G13-0000; EPA 1999 [Section C. 2. Warm Water Raceway and Associated Full-flow Settling Basin Discharges]) as well as in the TMDL process developed under the Mid-Snake TMDL (Buhidar 1997) or the Upper Snake Rock TMDL (Buhidar 1999, Buhidar 2000) or the modifications incorporated in the Upper Snake Rock TMDL Modification (Buhidar 2005). Therefore, the use of the 0.200 mg/L Net TP for warm water facilities in the Jacks Creek TMDL Modification is consistent and provides a rational basis for use of this provision.

   Therefore, based on the discharge monitoring reports for the period of record for the Arraina facility (May 2000 through February 2004) and the Ace facility (May 2000 through February 2004), the following are the Net TP WLAs (as shown in Table 4):

   Arraina Facility: 0.200 mg/L TP x 4.4 cfs (mean) x 5.4 = 4.8 lb/day TP
   Ace Facility: 0.200 mg/L TP x 2.7 cfs (mean) x 5.4 = 2.9 lb/day TP

   Based on the discharge monitoring reports for the Arraina facility period of record (May 2000 through February 2004), the raceway average TP net target load was exceeded 11 times in 24 sampling months (or 45.8% of the time). The Ace Development facility for the same period of record exceeded the TP net target load 16 times out of 22 sampling months (or 72.7% of the time).

   3. *E. coli* WLA: As stipulated in Buhidar and Sharpnack (2003): "Relative to the aquaculture industry in the Upper Snake Rock subbasin, the fecal coliform or *E. coli* criteria are not indigenous to cold water fish hatcheries or warm water fish hatcheries. Total coliform bacteria are a collection of relatively harmless microorganisms that live in man and warm- and cold-blooded animals. They aid in the digestion of food. A specific subgroup of this collection is the fecal coliform bacteria, the most common member being *E. coli*. Fecal coliform bacteria and *E. coli* are generated in the intestines of man or warm-blooded animals. Fish, whether raised in cold water or warm water, are cold-blooded animals and do not generate fecal coliform bacteria or *E. coli* in their intestines." Consequently, no limitations are imposed for *E. coli* on the fish hatcheries of Jacks Creek. Their WLA for *E. coli* is zero.

   No information was available form the discharge monitoring reports for the *E. coli* load for the period of record. But it is assumed under the scenario

described in the previous paragraph that the facility does not discharge *E. coli* as a component of their effluent. Therefore, a WLA of zero is applied.

VI. LOAD ALLOCATIONS (LAs)

The load allocation (LA) is the portion of a receiving water's LC that is attributed either to one of its existing or future nonpoint sources of pollution or to natural background sources.

In order to mathematically define the LA for Jacks Creek, the starting point is with the LC. The LC, as previously described (Section IV) is the greatest amount of loading that water can receive without violating water quality standards. By mathematical definition, the components that make up the LC cannot be greater than the LC itself. Consequently, the LA for nonpoint sources combined with the WLA for point sources must be less than the LC. To these components must be added the definition of "available load" (AL) which represents the load that is actually available for allocation between point sources and nonpoint sources after the uncertainty component is considered. That uncertainty component is best defined as the margin of safety (MOS) which is further described in Section VII. But essentially, the available load is the LC minus the MOS (as 10% of the LC). Therefore,

AL = LA + WLA = LC - MOS

LA = LC - MOS - WLA = LC - (MOS + WLA)

TSS LA: 4,722.3 lb/day TSS - (472.2 lb/day + 575.1 lb/day) = 3,675.0 lb/day TSS

TP LA: 9.44 lb/day TP - (0.94 lb/day + 7.70 lb/day) = 0.80 lb/day TP

E. coli LA: 53.9 cfu^9/day *E. coli* - (5.4 cfu^9/day + 0.0 cfu^9/day) = 48.5 cfu^9/day *E.coli*

Within the structure of the Jacks Creek TMDL Modification, the LA was further divided into the following three (3) general categories: (1) permitted nonpoint source facilities; (2) Ag, Graze, Private, Corridor; and (3) stormwater construction-type facilities.

1. The first general category deals with permitted nonpoint source facilities associated with the Federal Energy Regulatory Commission (FERC) permitted hydropower facilities; all land application facilities (LAFs) that may or may not require a permit from the State; and all confined feeding operations (CFOs) that may or may not require an NPDES permit from EPA for a 24-hour, 25 year storm event.

2. The second general category deals with all agricultural lands (inclusive of irrigated and non irrigated lands farmlands); grazing on public lands and state lands; private land ownership that includes all nonpoint source activities; and those activities of sort that are more closely related to the Jacks Creek stream corridor that are not necessarily associated with the other sub components of this second general category.

3. The third general category deals with all construction-type activities that may or may require a general permit (from EPA) that may have a direct impact to Jacks Creek and which require erosion and sediment controls. This third category utilizes a 2% reserve from the overall nonpoint source category and reverts back to this category once the construction activity is finalized.

Precedence and justification for this 2% approach may be shown in Buhidar (2005). Calculations for this category are summarized as follows:

Construction Activities = Pollutant LA x 2%

TSS Construction Activities: 3,675.0 lb/day x 2% = 73.5 lb/day TSS

TP Construction Activities: 0.80 lb/day x 2% = 0.02 lb/day TP

E. coli Construction Activities: 48.5 cfu^9/day x 2% = 1.0 cfu^9/day *E. coli*

In terms of future growth for nonpoint sources, no specific allocation was set aside for this, therefore the allocation is zero. However, as a general consideration, it is noted that future growth of the Jacks Creek drainage may incorporate a landuse change (such as from agricultural or grazing lands to subdivisions). Such changes or any similar to it will still be considered a part of the overall nonpoint source category that is associated with the LA and must demonstrate compliance with the overall water quality goals of the Jacks Creek TMDL Modification in order to be in compliance with the TMDL process.

VII. MARGIN OF SAFETY (MOS)

A 10% margin of safety (MOS) was applied on all pollutants-of-concern as defined in the Bruneau River TMDL (Lay 2000 [p 101]) and in the Jacks Creek TMDL Technical Support Document (Buhidar 2006). Woven into this explicit MOS is an implicit component with the assumption "that conservative approaches taken throughout the [*Bruneau River TMDL*] will have been sufficiently identified in appropriate sections" (Lay 2000 [p 101]). As defined under U.S. Code Title 33, Chapter 26, Sub Chapter III, §1313 (d) (1) C, "Such load shall be established at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality." Therefore, the 10% MOS is to account for any lack of knowledge concerning the relationship between effluent limitations and water quality. As such:

1. TSS MOS: 10% of the LC. Therefore,

   4,722.3 lb/day TSS LC x 10% = 472.2 lb/day TSS MOS

2. TP MOS: 10% of the LC. Therefore,

   9.44 lb/day TP LC x 10% = 0.94 lb/day TP MOS

3. *E. coli* MOS: 10% of the LC. Therefore,

   53.9 cfu^9/day *E. coli* LC x 10% = 5.4 cfu^9/day *E. coli* MOS

VIII. SEASONAL VARIATION

The application of a seasonal component into the TMDL for Jacks Creek was not considered because little information existed to allow for this. Therefore, the seasonal variation is zero. However, it is reasonable to assume that future iterations of the Jacks Creek TMDL

Modification may require seasonal considerations and therefore are deferred until such time as more information is provided to justify this.

IX. OVERALL TMDL TABLE BASED ON THE LC FOR JACKS CREEK

Table 3 summarizes Sections IV, V, VI, VII and VII as previously noted. The overall TMDL table (Table 3) is based on the water quality targets set for Jacks Creek on instream water quality targets for TSS (50.0 mg/L), TP (0.100 mg/L) and E. coli (125 cfu/100 mL as a geometric mean). The flow provisions are based on average flows of 17.49 cfs for Jacks Creek.

Table 3. Jacks Creek Overall TMDL Table

TMDL COMPONENTS	TSS, lb/day	TP, lb/day	*E. coli*, cfu^9/day
NONPOINT SOURCES			
FERC, LAFs, CFOs	3,601.5	0.88	47.5
Ag, Graze, Private, Corridor	0.0	0.0	0.0
Stormwater - Construction - 2%	73.5	0.02	1.0
NPDES PERMITTED POINT SOURCES			
Ace Development FH	218.7	2.90	0.0
Arraina Inc. FH	356.4	4.70	0.0
Margin of Safety - 10%	472.2	0.94	5.4
Loading Capacity	4,722.3	9.44	53.9

E. coli = *Escherichia coli*. TSS = Total Suspended Solids. TP = Total Phosphorus. WLA = Wasteload Allocation for an NPDES permitted point source facility. Seasonal variation is not a component in the Jacks Creek TMDL Modification at this time. FERC = Federal Energy Regulatory Commission permitted hydropower facilities. LAFs = Land Application Facilities. CFOs = Confined Feeding Operations like dairies and feedlots of all sizes. Ag = All agricultural cropland and farmland combined. Graze = All grazing lands. Private = All privately owned lands. Corridor = All stream corridor components associated with Jacks Creek. FH = Fish Hatchery.

Relative to TSS, the overall nonpoint source category (3,675.0 lb/day TSS) represents 77.82% of the TSS LC. The point source category (575.1 lb/day TSS) represents 12.18% of the TSS LC. The remaining 10% is attributable to the TSS MOS.

Relative to TP, the overall nonpoint source category (0.90 lb/day TP) represents 9.53% of the TP LC. The point source category (7.60 lb/day TP) represents 80.51% of the TP LC. The remaining 10% is attributable to the TP MOS.

Relative to *E. coli*, the overall nonpoint source category (48.5 cfu^9/day *E. coli*) represents 90.0% of the *E. coli* LC. The point source category (0.0 cfu^9/day *E. coli*) represents 0.0% of the *E. coli* LC. The remaining 10% is attributable to the *E. coli* MOS.

X. REASONABLE ASSURANCES

Providing reasonable assurance that point sources and nonpoint sources will meet the beneficial uses of Jacks Creek is a necessary requirement of the Jacks Creek TMDL Modification. By determining the LC for Jacks Creek (for TSS, TP and *E. coli*) and by allocating allowable limits within the confines of the LC provides reasonable assurance that the LC can be met by both the point sources and the nonpoint sources (assuming both sources meet their imposed targets). Therefore, reasonable assurance will provided through the following:

1. Point Sources. Point sources (fish hatcheries) will receive WLAs that are below and within the LC of the Jacks Creek waterbody; and are specifically set up to

meet the beneficial uses of Jacks Creek, and thus the beneficial uses of the C. J. Strike Reservoir of the Snake River. This will be accomplished through the NPDES permitting process since TP makes up 80.51% of the TP LC in the point source category.

2. Nonpoint Sources. Nonpoint sources will receive LAs that are below and within the LC of the Jacks Creek waterbody; and are specifically set up to meet the beneficial uses of Jacks Creek, and thus the beneficial uses of the Snake River. IDEQ-TFRO in conjunction with the land management agencies will coordinate with public and private land ownerships to incorporate water quality cleanup projects specifically targeted to reducing erosion and sediment sources since TSS makes up 77.82% of the TSS LC in the nonpoint source category. Associated with this is 90.0% of the *E. coli* that is attributable to the nonpoint source category.

In the case of Jacks Creek, both the point source and nonpoint source industries will provide management strategies that support reasonable assurances in meeting the water quality standards and beneficial uses of Jacks Creek and the C. J. Strike Reservoir of the Snake River jointly.

XI. MONITORING PLAN TO TRACK TMDL EFFECTIVENESS

In addition to monitoring that will be conducted by the NPDES permitted facilities, IDEQ-TFRO will monitor (depending on available resources) Jacks Creek, especially as it pertains to any water quality cleanup projects (as referenced in Section XII). Monitoring will include the following: (1) headwaters reach below the merging of Little Jacks Creek and Big Jacks Creek, and (2) at the eight (8) sites as described in the Jacks Creek Technical Support Document (Buhidar 2006).

In addition, the Beneficial Use Reconnaissance Program (BURP) will be utilized to determine the status of beneficial uses on Jacks Creek as defined by the protocols of BURP.

Other monitoring will be assessed that involves private landowners, public land management agencies, and the Idaho Soil Conservation Commission and the associated Soil and/or Water Conservation District. Erosion assessments for nonpoint source considerations will also be determined as monitoring is further developed over the next 5 years.

XII. IMPLEMENTATION PLANNING

As part of the overall Bruneau River TMDL implementation planning process, the Jacks Creek TMDL Modification is a part of that process. IDEQ-TFRO is in the process of assessing potential water quality cleanup projects on Jacks Creek with the assistance of the Bruneau River Group and the associated land management agencies. IDEQ-TFRO in conjunction with the ISCC will continue to provide technical assistance to the various private land owners associated with the Jacks Creek drainage relative to water quality cleanup projects that achieve the beneficial uses of Jacks Creek.

XIII. PUBLIC PARTICIPATION

Prior to finalization of the draft Jacks Creek TMDL Modification, IDEQ-TFRO visited the Jacks Creek watershed and the NPDES permitted facilities along with various land owners to gather the necessary information for establishing the TMDL. IDEQ-TFRO will publicly notify and

conduct a public review process (i.e. 30 days) to receive comments from the Jacks Creek interests; as well as from the Bruneau River Group.

XIV. REFERENCES

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Appendix A. Map of the Jacks Creek Drainage Area and Fish Hatcheries.

Jack's Creek